

Review article

Melioidosis (infectious disease)

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Abstract:

Burkholderia pseudomallei a soil saprophyte, is the cause of the tropical infectious illness melioidosis, which is on the rise. The illness is distinguished by a high case fatality rate and erratic clinical presentations. Over the past ten years, there have been more instances recorded from different areas of India, which suggests that the disease may be endemic and that the subcontinent is underdiagnosed.

Keyword: *Burkholderia*, *Melioidosis*, *soil saprophyte*

Introduction:

When conducting a post-mortem on the 40-year-old Burman inhabitant of Rangoon, Burma (now known as Myanmar), in April 1911, Alfred Whitmore and CS Krishnaswami made the diagnosis of melioidosis. In detail, Dr. Whitmore reported what was seen on the patient's autopsy table at Rangoon General Hospital: "The primary lesion found at the post-mortem examination was an odd, corny consolidation of the lungs." When examined under a microscope, the consolidation revealed "a large number of non-Gram staining bacilli of the size and shape of *Burkholderia mallei* (*B. mallei*)" and "was not consistent with either tubercular infection or ordinary lobar pneumonia." The newly discovered bacterium, *Bacillus pseudomallei*, has lost substantial amounts of its genetic material in the process of becoming adapted as an equine pathogen (Wiersinga, *et al.*, 2018).

The bacteria was known by a number of names for a long time, including *Bacille de Whitmore* or *Bacillus whitmorii*, *Malleomyces pseudomallei*, and *Pseudomonas pseudomallei*. In 1992, it was called *Burkholderia pseudomallei*. The Latin terms "melis" (distemper of asses) and "eidos" (resemblance) are where the disease earned its name in 1932 (Lewis & Torres, 2016).

Burkholderia genus consists of over 40 species and *B. pseudomallei* is one among them. This bacterium is motile, aerobic, non-spore forming and Gram negative bacillus. It did not induce the characteristic Strauss reaction. A decade back, the

Sanger Institute has published the 7.2 Mb genome of *B. pseudomallei*, with two chromosomes (4.07 Mb and 3.17 Mb), and a G+C content of 68% (Lewis & Torres, 2016). Another species, *B. mallei*, is particularly pathogenic in humans and causes glanders in horses and other solipeds. Another species, *B. cenocepacia*, can cause opportunistic infections in cystic fibrosis patients. But the other two isolates, *B. thailandensis*, which is found in the soil of Thailand and Australia, and *B. oklahomensis*, which is found in the Midwest of the United States, are less virulent. (Wiersinga WJ *et al.*, 2012).

Melioidosis in Animals

Camels, ponies, lambs, cattle, horses, pigs, and kangaroos have all been demonstrated to be vulnerable to melioidosis, as have koalas, llamas, deers, cats, and canines, as well as confined marine creatures. Despite their regular contact to mud, cattle, water buffalo, and crocodiles are thought to be reasonably resistant to melioidosis. Melioidosis is likewise thought to be largely resistant in birds, however instances have been observed. Animals such as inbred mouse strains, chickens, rats, and guinea pigs have all been utilized in experimental studies. The vulnerable BALB/c and more resistant C57BL/6 inbred mouse strains have lately been employed extensively in investigations of *B. pseudomallei* host responses (Chantratita, *et al.*, 2014).

Bacteriology in general

B. pseudomallei is a slender, rounded-end, vacuolated, gram-negative bacillus with bipolar staining that is also known as a "safety pin" bacillus. It is oxidase positive and differentiable from the closely related but less pathogenic *B. thailandensis* due to its ability to digest arabinose. Whitmore distinguished it from *Burkholderia mallei* based on the way it moved on a hanging drop; however, on semisolid media, this distinction is less clear.

In culture, the organism exhibits a variety of colonial morphologies; smooth colonies are usually observed initially, followed by dry or wrinkled colonies with additional incubation. In Thailand, future research is being done on the therapeutic value of various colony types, especially small-colony variants (N. Chantratita, personal communication) (Myers, *et al.*, 2014).

B. pseudomallei's epiphytic nature was discovered in French Indochina in 1955. Based on the high incidence among helicopter crews, several early investigations identified the aerosolization of dry dusts as a route of acquisition for American personnel in Vietnam (204). However, more research has shown that wet soils and pooled surface water produce the maximum yields.

The substantial correlation between surface water and mud exposure during work and play, especially during planting and flooding of rice fields around the beginning of the monsoonal season, has been shown to be a key cause of melioidosis (Pudla, *et al.*, 2011).

Virulence Factors in Bacteria

Like many saprophytic organisms, *B. pseudomallei* is a resilient bacterium that can withstand a variety of unfavorable conditions, such as a lack of food, pH levels in the acidic and alkaline ranges, disinfection and antiseptic solutions (such as detergents and chlorine), exposure to antibiotics, and extremely high or low temperatures (French, *et al.*, 2011). *B. pseudomallei* produces a variety of enzymes to help it adapt to its many hosts, including lipases, proteases, lecithinase, catalase, peroxidase, superoxide dismutase, hemolysins, a cytotoxic exolipid, and siderophores. Complement, lysosomal defensins, and cationic peptidases cannot destroy it, and it may thrive in a variety of eukaryotic cell types, including phagocytes and macrophages (Gee, *et al.*, 2017).

Slow-growing small-colony variations, for example, can be seen on primary plates from clinical specimens (V. Wuthiekanun, personal communication) or produced by passaging in vivo or in vitro, and are likewise linked to considerable antibiotic resistance. These variations may then return to their original shape and antibiotic sensitivity on their own (Vadivelu, *et al.*, 2017). Other mutant forms of the organism, such as cell wall-deficient L-forms that can only be produced in vitro by passing through rabbit alveolar cells, have yet to be determined. This shows that unexpected processes, such as the "globi" seen in macrophages and large cells in autopsy specimens, may be involved in *B. pseudomallei*'s survival within the body (Lewis & Torres, 2016).

Melioidosis infection types :

After being exposed to *B. pseudomallei* bacterium, symptoms often start to show up one to four weeks later. Both localized and widespread melioidosis are conceivable, as are subclinical infections. A localized infection frequently manifests as a skin abscess, nodule, or ulcer. Fever and myalgias are typical symptoms. The most typical symptom of melioidosis is a lung infection (Hayden , *et al.*, 2012):

- 1- can exhibit symptoms ranging from severe pneumonia to moderate bronchitis.
- 2- Pulmonary melioidosis is characterized by coughing, which can be either productive or nonproductive.
- 3- High temperature, headache, chest discomfort, anorexia, and myalgias are possible symptoms.

- 4- Chest X-ray lesions that might resemble those associated with pulmonary TB

Acute and chronic melioidosis can both result in rapid-onset septicemia and widespread infection. Patients with underlying risk factors, such as diabetes and renal insufficiency, are more likely to have these problems. Abscesses can occur anywhere in the body, however they are most commonly discovered in the liver, spleen, or prostate. Additionally, the brain, skin, lymph nodes, joints, bones, and viscera may be affected (Chantratita , *et al.*, 2014).

Among the symptoms are:

A fever, A headache, Distress related to breathing , Chest or abdominal pain , The pain in my body , Disorientation Convulsion (Chantratita , *et al.*, 2014).

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